

# Basic Knowledge

# Process Engineering and Building Services Engineering



The implementation of energy-efficient concepts is much easier if they can be incorporated into the planning of production at an early stage.

## Resource-efficient production plants

Nowadays an interdisciplinary approach is needed, as indicated in the example of a resource-efficient supply of raw materials and energy. Various aspects from the fields of energy engineering, building services engineering and process engineering must be taken into consideration. The combination of the otherwise mostly independent subject areas of building services engineering and process engineering is based on this knowledge. Any future-oriented education must include this combination of these two subject areas. This ensures that the challenges of designing energy-efficient production plants will be met in the future.

## Joining sub-systems

The joint approach of building services engineering and process engineering has been successfully implemented in the construction of new industrial or commercial buildings or the modernisation of old ones. A significant increase can be noted in this regard. The willingness to accept the associated higher expense has increased significantly due to the positive experience gained from projects implemented to date. This trend is supported by government funding. The valuable lessons learned from the operation of coupled systems flow into the further development of individual components and energy-efficient control systems.

## Energy-optimised plant control

For the energetic optimisation of process engineering plants, it is first necessary to consider which sub-processes or components are affected by energy losses. In existing plants, additional components and measuring equipment often have to be installed for this purpose. It should then be possible to measure all relevant energy flows of the plant. In order to identify potential savings, the measurement data must first be analysed and the individual process steps accounted for. These savings can then be exploited by optimising the plant control system. However extensive experiments are usually required in order to simultaneously maintain the same product quality.

## Heat recovery in food production

Lots of energy is used during the production of food, in the form of hot water, process heat, cooling and heating. An example of process engineering from this field is the use of a temperature-controlled stirred tank. Typical requirements for such a system are:

- rapid heating of the components to be treated prior to entry into the tank
- constant temperature during treatment in the tank
- rapid cooling of the products produced by the treatment
- energy-efficient operation of the plant

Efficient control systems are needed in order to meet all the requirements, alongside a possibility for heat recovery. What effects are possible, such as changes in the control parameters, can be studied using our RT 682 trainer.



Large-scale stirred tanks



Detecting and measuring the energy flows is a prerequisite for the optimisation of existing plants.

## Valves and fittings in process engineering

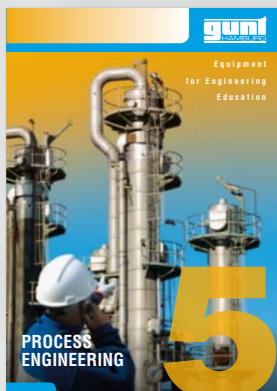
Adjustable valves and fittings are used in process engineering when materials with fluid properties have to be transported in piping systems. They are responsible for limiting the flow rate to a certain value.

Naturally, limiting a given flow rate through a valve or fitting is associated with a pressure drop and thus with a loss of hydraulic power. If the only aim is to adjust the flow rate through a main pipe, it is for example more energy efficient to use a pump with an adjustable flow rate. In branched piping systems however, this is not always possible or economically viable. In this case, adjustable valves and fittings are often used.

When selecting suitable valves and fittings, besides the specific requirements of the intended application, basic design questions must be taken into account in order to ensure a low-loss operation. For experiments in this field of process engineering, we recommend our RT 396 pumps, valves and fittings test stand.



Valves and fittings of a large-scale distribution station



Many of the fundamental themes of process engineering are also covered by a wide selection of educational systems from our catalogue 5.

**Catalogue 5**  
Process Engineering